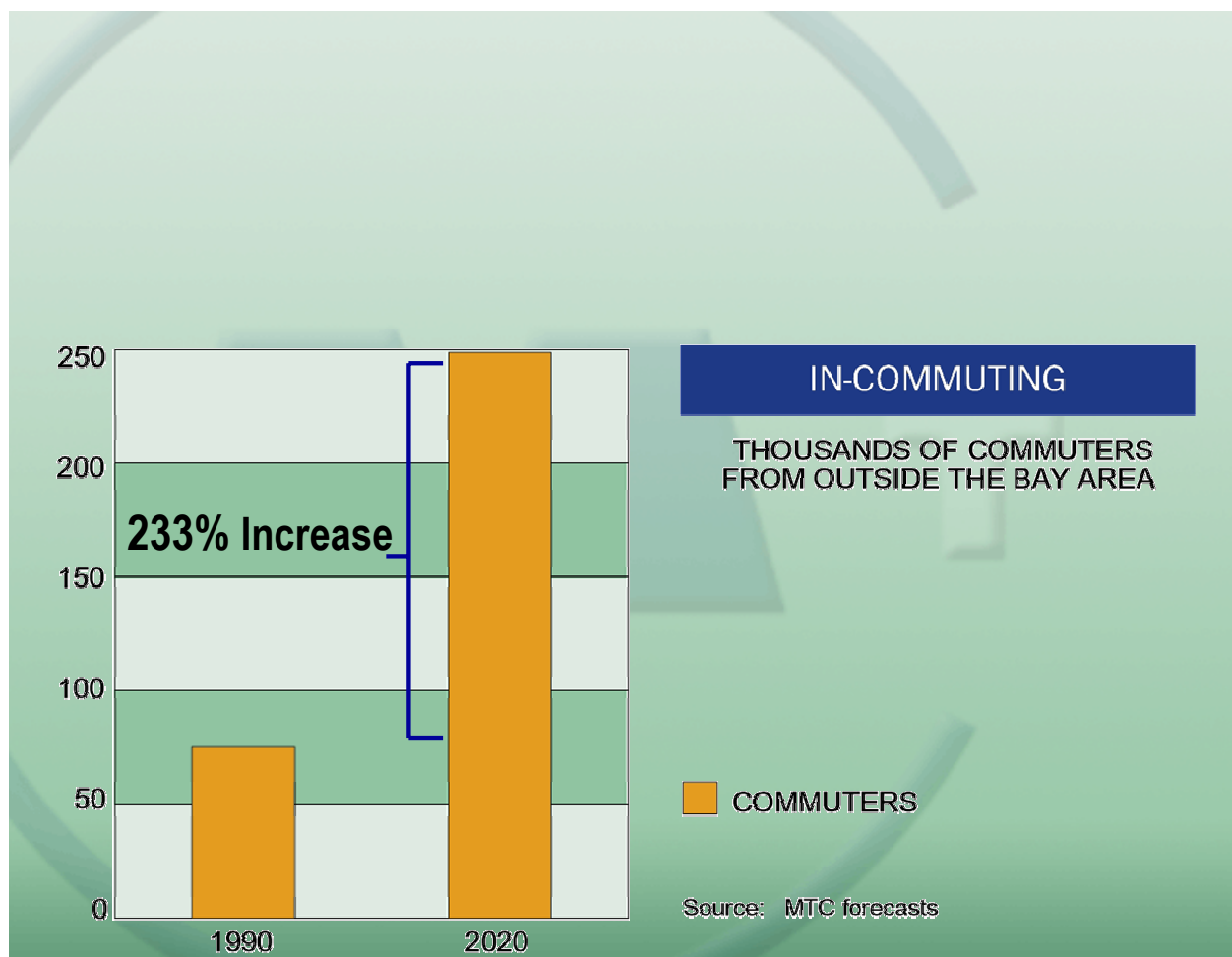


Figure 8
Growth of Commuting into the Bay Area, 1990 - 2020



- San Francisco (Transbay Terminal or 4th and King),
- San Francisco Airport (Millbrae)
- Redwood City or Palo Alto
- Santa Clara (optional)
- Downtown San José
- Gilroy/Morgan Hill

Along the East Bay Corridor, the proposed station locations are the following (Figure 4):

- Oakland (West Oakland or 12th Street/City Center)
- Coliseum BART Station
- Union City Station or Auto Mall Parkway Station (also called the South Alameda Station)

In addition, a Los Baños Station is proposed close to the junction of State Route (SR) 152 and Interstate 5 (I-5) (Figure 4).

The primary airports within the Bay Area are San Francisco International (SFO), Oakland International (OAK), and San José International (SJC). Sonoma County Airport (STS) is a general aviation airport north of the City of Santa Rosa. As depicted in Figure 1 through Figure 2, the primary north-south highways within the Bay Area are US 101 and I-280 on the Peninsula, I-880 and I-680 in the East Bay. I-80 links San Francisco and Oakland via the Bay Bridge and continues on to Sacramento. I-580 and SR 152 provide access to I-5 in the Central Valley. I-380 and SR 87 provide east-west access on the San Francisco Peninsula to the San Francisco and San José airports, respectively.

There are a number of transit providers in the region, with the primary agencies in the proposed rail corridors as follows:

- Municipal Railway (Muni), providing bus and light rail transit in San Francisco and bus service to parts of Daly City in San Mateo County
- Bay Area Rapid Transit District (BART), providing rapid rail transit throughout Contra Costa, Alameda, and northern San Mateo counties
- Golden Gate Transit and Bridge District, providing ferries on the Bay and bus transit between Sonoma, Marin, and San Francisco counties,
- Alameda County (AC) Transit, providing bus transit in Alameda County with express service into San Francisco via the Bay Bridge and limited express service to San Mateo County (via the San Mateo and Dumbarton bridges), and Santa Clara County
- Valley Transit Agency (VTA), providing bus and light rail transit in Santa Clara County, with limited connections to San Mateo County
- Merced County Transit, providing bus transit service in Merced County
- San Benito County Transit, providing shuttle bus service between Hollister, San Juan Bautista, Salinas, and South Santa Clara County
- Caltrain, providing commuter rail service from Gilroy to San Francisco
- San Mateo County Transit District (SamTrans), providing bus transit throughout San Mateo County and into parts of San Francisco and Palo Alto
- Altamont Commuter Express (ACE), providing limited commuter rail service between Stockton and San José
- Amtrak Capitols, providing limited commuter rail service between the Sacramento area and San José

2.2 GENERAL DESCRIPTION OF TRANSPORTATION FACILITIES

2.2.1 Rail Stations

There are 15 proposed stations, including alternate locations, in the Bay Area to Merced section of the project. Table 3 lists the bus and rail lines providing transit access at the stations. Arterial streets providing station access are briefly described below, while freeway links are described under Section 2.2.3

1. Transbay Terminal, San Francisco

The Transbay Terminal in San Francisco is the first High Speed Rail station on the west side of the Bay and is located on Mission Street between First and Fremont Streets. The major freeways serving the section are US-101 and I-80. The one-way streets, Howard Street (westbound), First Street (southbound) and Fremont Street (northbound) are the major arterials serving the station area. Near the station area, the width of Howard Street varies from five lanes to two lanes. First Street is four lanes to two lanes wide and Fremont Street is three lanes wide. Mission Street is another arterial serving the station area, which has one lane in each direction.

The Transbay Terminal is the San Francisco terminus of AC Transit's Transbay bus routes. Transit services are also provided by Golden Gate Transit, SamTrans, San Francisco Municipal Railway (Muni). The Bay Area Rapid Transit (BART) is accessible within a walking distance and the Caltrain is accessible through connecting Muni services (Table 3).

2. 4th and King, San Francisco

The proposed alternate station will be located southwest of the Transbay Terminal, less than a mile away. I-80 and I-280 are the major freeways serving the region. King Street is the major arterial and Townsend and Fourth Street are the minor arterials serving the station area. King Street is two lanes wide both ways to the west of Fourth Street and becomes a one-way street (eastbound) two lanes wide to the east of Fourth Street. Townsend Street is also two lanes wide in each direction. Fourth Street is two lanes wide each way and becomes a one-way street (southbound) to the north of Townsend. Fourth and King is also the first station on the Caltrain line. It is served by MUNI bus transit and light rail transit.

3. Millbrae Station, San Francisco Airport

This region is served primarily by US 101. State Route 82 and Millbrae Avenue, a major arterial, provide access to the region. I-280 also provides freeway access to local arterials on the western edge of the city. East Millbrae Avenue is a two-way minor arterial which is two lanes wide to the east of SR-82 and one lane wide to the west of SR-82. Trousdale Drive is a two lane wide local street, which serves the local traffic. California Drive is a two-way, minor arterial, which is one lane wide in each direction to the South of Trousdale Drive.

Transit access is by Caltrain and SamTrans. Free Caltrain shuttle runs between the Millbrae station and San Francisco Airport. BART's extension to San Francisco will include it in the list of major transit service providers for the Millbrae region.

4. Redwood City

US 101 is the major freeway serving the Redwood City. I-280 also provides freeway access to local arterials on the western edge of the city. State Route 82, El Camino Real, provides access to the station area. Several arterials can be used by local traffic to access the station area. Broadway, Jefferson Avenue and Middlefield Road are the minor arterials serving the area. All the three arterials are two lanes wide in

each direction. Major local streets that serve the area are James and Hopkins, which are both one lane wide in each direction. Caltrain and SamTrans are the major transit service providers.

Table 3
Connecting Transit Service at HST Stations and Airports

Connecting Transit Service	
HST Stations	
Transbay Terminal	Muni 5, 6, 10, 14, 14L, 14x, 38, 38L, 76, 108; AC Transit F, N, NL, O, A, B, BX, C, CB, E, FS, G, H/HX, K, KH, L, LA, LB, LC, LD(LX), NF, NG, NH, NV, OX/OX1, P(CH), RCV/RCVX, S, SA (SW), SB, V, W(WI), WA(W2), Y, Z; SamTrans DX, KX, MX, NX, PX, RX, TX, 391, 292; Golden Gate Transit Service 10, 20, 30, 50, 60, 70, 80, 2, 4, 8, 18, 24, 26, 28, 32, 34, 38, 44, 48, 54, 56, 72, 74, 76, 78, 90, 93
Fourth & Townsend	Muni 10, 15, 30, 38L, 45, 47, 80x, 81x, 82x, N-Judah Light Rail, Caltrain
Millbrae	SamTrans MX, 242, 390, 391, Caltrain, BART ¹
Redwood City	SamTrans KX, PX, RX, 270, 271, 390, 391, Caltrain
Palo Alto	SamTrans KX, PX, RX, 280, 281, 282, 390, 391; SCVTA 22, 35, 86, 300, Caltrain
Santa Clara	SCVTA 10, 22, 32, 34, 44, 60, 300, 304A, Caltrain
San José	SCVTA 11, 22, 63, 64, 65, 68, 180, 300, 304A, Hwy. 17, Caltrain
Morgan Hill	SCVTA 14, 15, 521, Caltrain
Gilroy	SCVTA 18, 18A, 19, 68, 521, Caltrain
West Oakland	AC Transit 13, 14, 62, 82, 82L; BART
Oakland City Center	AC Transit 42, 50, 62, 72L, 82, 88, A, 314; BART
Oakland Coliseum	AC Transit 45, 46, 49, 49X, 49M, 56, 57C, 58, 98; BART
Union City	AC Transit 97, 99, 211, 213, 231, 232, 233, 234, 258, 301; SCVTA DB, DB1, 1, 2, 3, 4; BART
Auto Mall Parkway	AC Transit 214, 232, 235, 330
Los Baños	Currently, there are no transit services serving the station area.
Airports	
San Francisco (SFO)	Sam Trans 193, 292, 397, BX, KX; BART ¹
Oakland (OAK)	AC Transit 49X, 49M, 58
San José (SJC)	SCVTA 10 ² , 44, 122, 304, 521
Sonoma County (STS)	No transit service.
¹ Currently there is a Caltrain shuttle bus connecting the Airport to the Millbrae Caltrain station, which will be replaced by BART after June 22, 2003. ² VTA shuttle to Caltrain Source: Muni, SamTrans, Santa Clara Valley Transportation Authority, AC Transit, Golden Gate Transit, Merced County Transit, Caltrain, BART, 2003.	

5. Palo Alto

The Palo Alto Station, an alternate to the Redwood City Station, falls between US 101 and I-280. SR-82 is also used by local traffic to access the station area. Local shuttles connect different parts of the city to the Caltrain Station. University Avenue and Embarcadero Road are the major arterials providing access to the station area. Both the arterials have bi-directional traffic and are two lanes wide in each direction. Arboretum Road, Palm Drive and Alma Street are the collector streets feeding the station area. These two-way arterials are two lanes wide in each direction. Both SamTrans and VTA provide transit access to the station area.

6. West Oakland

This will be the first HST station along the East Bay alignment. I-880 and I-980 are the major freeways feeding the region. Adeline Street, 7th Street and 14th Street are the major arterials near the station area. They are two-way roads, two lanes wide in each direction. Mandela Parkway is a two-way minor arterial, two lanes wide in each direction, which serves the station area. Peralta and 8th Street are the local roads serving the area. Peralta is one lane wide in each direction. To the west of Union Street, 8th Street is a one-way road (eastbound) one lane wide. To the east of Union Street, it is two lanes wide in each direction. Amtrak, AC Transit buses and BART provide transit services to the station area.

7. Oakland 12th Street/City Center Station

The City Center Station is an alternate end-of-line station for the East Bay alignment. It would be located underground adjacent to and on the west side of the 12th Street BART Station at Broadway. I-880 is six blocks south of the proposed location. Broadway, San Pablo, Telegraph and 14th Street are the major arterials serving the area. All the four arterials are two-way streets, having two lanes in each direction. One-way streets, Webster (westbound) and Franklin (eastbound) that provide local access are two lanes wide. In addition to BART, the station would be served by AC Transit bus lines.

8. Oakland Coliseum/Oakland Airport

I-880 is the major freeway serving the Oakland Airport and Coliseum region. San Leandro Street and Hegenberger Road are the major arterials used for accessing the Oakland Airport and Coliseum region. San Leandro Street is two lanes wide in each direction and Hegenberger road is three lanes wide in each direction. 77th Avenue is a local street near the station area, one lane wide in each direction. BART and AC Transit are the major transit service providers. Air-BART a direct shuttle between the airport and the BART station also aids transit.

9. Union City Station

The major freeway serving the region is I-880. Other major roadways serving the region are Alvarado Niles, Decoto Road and I-238. Decoto and Alvarado Niles are the major arterials leading to the station area. Both the arterials are two lanes wide in each direction. Union City Transit, BART and AC Transit serve the area.

10. South Alameda

The proposed South Alameda station will be located in a very sparsely populated neighborhood. Boyce Road and Auto Mall Parkway are the main roads and I-880 is the freeway leading to the region. Auto Mall Parkway and Boyce road are the two major arterials feeding the station area. Auto Mall Parkway is three lanes wide in each direction and Boyce road is two lanes wide in each direction. AC Transit provides bus service to this region.

11. Santa Clara

The US-101 and I-880 freeways and SR-82 serve this region. Market, Lafayette and Washington are the major arterials serving the region. Benton, Homestead and Lafayette are the minor arterials feeding the region. They are all two lanes wide (each direction) near the station area. Santa Clara Valley Transportation Authority (VTA) provides bus and light rail service in Santa Clara County. In addition, VTA jointly operates Highway 17 Express with Santa Cruz Metro.

12. San José

The region is served by the I-880 and I-280 freeways and by the roadways, San Carlos, Santa Clara and 82. San Carlos, Park and Santa Clara are the major arterials serving the region. They are all two lanes wide (each direction) near the station area. Bird Avenue a two-lane road (each direction) is a collector street feeding the area. VTA, Amtrak and Caltrain provide transit services to the area.

13. Morgan Hill

US 101 is the major freeway in the area. Hale and Dunne are the major arterials in the station area. Monterey Street, Hale and Dunne are the major arterials in the station area. All these arterials are two lanes wide (each direction), near the station area. Main Street is a minor arterial, one lane wide in each direction east of Monterey Street and two lanes wide in each direction to the west of Monterey Street. The station area is served by Caltrain and VTA.

14. Gilroy

US-101 is the major freeway (and SR-152) for accessing the region. Monterey Highway is the major arterial feeding the Gilroy station area. Near the station area, it is two lanes wide in each direction. Tenth Street, a local road one lane wide in each direction will also be used by the local traffic. VTA, Caltrain and San Benito County Transit are the major transit service providers.

15. Los Baños

Los Baños is very thinly populated city with a total population less than 26,000 as of 2000. SR-152 and I-5 serve the region. The local traffic would be accessing the station area through the Henry Miller Avenue (SR-33), which is one lane wide in each direction. The region is auto-dependent. Merced County Transit is the transit service provider in the area.

2.2.2 Airports

Table 3 lists the bus and rail lines providing transit access at the airports. Arterial streets providing airport access are briefly described below, while freeway links are described under Section 2.2.3

1. San Francisco International Airport

Located 13 miles south of San Francisco next to the San Francisco Bay in San Mateo County, the San Francisco International Airport (SFO) is served by the US 101 and I-380 freeways. US 101 is described under Section 2.2.3. I-380 is a four- to six-lane freeway connecting I-280 with US 101 and SFO. San Bruno Avenue also provides local access to the north airport area, including the United Airlines maintenance facility. SFO is currently served by SamTrans buses, including a free shuttle from the Millbrae Caltrain Station. A BART line to SFO now provides a direct rail connection between the region and the airport (Table 3).

2. Oakland International Airport

Located adjacent to the San Francisco Bay at the southern edge of the City of Oakland, the primary freeway access to Oakland International Airport (OAK) is via I-880. Hegenberger Road, 98th Avenue, and Doolittle Drive/SR 61 provide arterial connections to I-880 and the adjacent communities. OAK is served by AC Transit buses, including shuttle service from the Coliseum BART Station (Table 3).

3. San José International Airport

The San José International Airport (SJC) is located on the border of the cities of San José and Santa Clara, just west of US 101. Freeway access to the airport is provided by US 101, SR 87, and I-880. US 101 and I-880 are described below in Section 2.2.3. SR 87 is a six-lane freeway that provides access from US 101 and the airport area to downtown San José. The segment opposite the airport is currently under construction to upgrade the existing six-lane divided arterial to a full freeway. De La Cruz Boulevard, Brokaw Road, and Coleman Avenue provide arterial connections to these freeways and the adjacent communities. SJC is served by VTA buses, including a free shuttle from the Santa Clara Caltrain Station (Table 3).

4. Sonoma County Airport

The Sonoma County Airport (STS), a local general aviation airport, is located two miles northwest of the City of Santa Rosa, just west of US 101. Airport Boulevard, a two-lane arterial, connects the airport with US 101 about two miles north of Santa Rosa. There is no public transit service to the airport. Because this airport is not considered for improvement under the system alternatives, it is not discussed further in this report (Table 3).

2.2.3 Modal Alternative Improvements

Figure 2 graphically illustrates the highway expansion assumed under the Modal Alternative. Table 1 describes the highway segments, giving the existing and proposed number of lanes. There are a total of 14 individual highway segments, as follows:

- US 101—San Francisco to San Francisco Airport (SFO)
- US 101—SFO to Redwood City
- US 101—Redwood City to I-880
- US 101—I-880 to San José
- US 101—San José to Gilroy
- US 101—Gilroy to SR-152
- SR-152—US 101 to I-5
- SR-152—I-5 to SR-99
- I-80—San Francisco to I-880
- I-80—I-880 to I-5 (Sacramento)
- I-880—I-80 to I-238
- I-580—I-880 to I-5 (via I-238)
- I-880—I-238 to Fremont/Newark
- I-880—Fremont/Newark to US 101

All highway segments are freeways except on SR 152. US 101 is an urban freeway that connects San Francisco with the rest of the Peninsula communities and the Santa Clara Valley as well as providing for intercity travel to central and southern California, either on US 101 or on I-5 via SR 152. SR 152 varies from a two- to four-lane highway to a 15-mile section of rural four-lane freeway that connects Gilroy with the Central Valley, intersecting I-5 at Los Baños and continuing on to SR 99. I-80 is an urban freeway in most of the Bay Area that connects San Francisco and Oakland via the Bay Bridge and provides access from Oakland to Sacramento and beyond. I-880 is an urban freeway along the east side of the San Francisco Bay, providing access from Oakland to the East Bay communities and San José. I-238 connects I-580 with I-880 about four miles south of the Oakland Airport. I-580 provides freeway access from Castro Valley to I-5 via through the Livermore and Dublin valleys.

For all segments except the San Francisco-Oakland Bay Bridge, which would not be expanded, the Modal Alternative would add a lane in each direction. In some cases, the expanded facilities would be close to the proposed HST stations and/or the regional airports. The expanded US 101 would be within one mile of the proposed HST stations in San Francisco, Millbrae, Redwood City, Morgan Hill, and Gilroy stations, as well as the SFO and SJC airports. The expanded I-880 would be within one mile of the proposed Oakland HST downtown and Coliseum BART stations. The other HST stations would be within two or three miles of the expanded highways. Thus the proposed modal improvements address traffic in the same corridors as the HST alignments.

2.3 SCREENLINES OR CORDONS COMBINING SEGMENTS OF THE PRIMARY ROUTES

Generalized screenlines around HST station areas and airports can be found in Appendix E (Figures E-1, E-2 and E-3). Screenlines for the major arterials feeding the station areas are shown in Appendix A. The intercity freeway or highway links on I-80, US-101, I-880, I-580/I-238, and SR-152 and their screenlines are also in Appendix E (Figures E-1, E-2 and E-3). The freeway links serve as regional access routes to the station areas and airports as well as through routes for intercity traffic. There is at least one screenline for each highway segment listed in Section 2.2.3 above. Near the three major airports, there are multiple screenlines to establish cordon lines. Appendix E figures E-4 to E-6 depict expanded views of the airport freeway screenlines for SFO, OAK, and SJC, respectively.

2.4 BASELINE RATIOS OF DEMAND TO CAPACITY ACROSS SCREENLINES OR CORDONS

Appendix E, Figure E-7 lists the baseline (1998) AM peak-hour demand-to-capacity ratios and levels of service for the HST station area screenlines. The screenlines are categorized by direction: northbound/eastbound (NB/EB) and southbound/westbound (SB/WB). Appendix A defines these screenlines while Appendix B gives the more detailed data from which there were calculated. All volume-to-capacity (V/C) values are less than one, with most experiencing LOS A ($V/C \leq 0.60$).² Palo Alto had the highest V/C ratio, 0.89 for LOS D, and downtown San Francisco had the second highest ratio of 0.87 (LOS D). The V/C ratios are listed separately by direction: northbound/eastbound (NB/EB) and southbound/westbound (SB/WB) to avoid aggregating the peak direction with the off-peak direction.

The aggregate screenline analysis masks, however, variations among the streets in the screenline. For example, in downtown San Francisco, Fremont Street was calculated to have a V/C of 1.30 (LOS F) while Main Street had a V/C of 0.91 (LOS E). Other station areas experiencing LOS F in 1998 on at least one street in the screenline include Millbrae, Redwood City, Palo Alto, Santa Clara, downtown Oakland, and Gilroy. Thus about half of the proposed station areas are already experiencing LOS F on one or more streets that would be affected by HST station traffic. Additionally, given that this is a link analysis that tends to understate the LOS problems that can occur at intersections on arterial streets, the actual situation could be worse than reported. Consequently, the addition of HST station traffic to some of these streets would cause adverse impacts.

² LOS values are defined from volume-to-capacity (V/C) values as follows: up to 0.60=A, above 0.60 to 0.70=B, above 0.70 to 0.80=C, above 0.80 to 0.90=D, above 0.90 to 1.00=E, above 1.00=F.

Intercity and airport access freeway links are analyzed as separate links and are depicted in Appendix E, Figure E-8. While peak-direction V/C and LOS values for the airport cordons are summarized in Appendix A, Figure E-8 and subsequent figures report the individual screenlines for each airport access freeway to better disclose the impacts. Access to airports was analyzed only at the freeway level because of the predominance of regional traffic accessing the airports and the expected absence of any adverse traffic impacts of the HST Alternative at airports. With the MTC modeling approach, the airport traffic is the same under the Modal Alternative as under the Baseline/No-Project Alternative. As a result, the airport screenlines were analyzed for the cumulative effect of station, airport, and intercity traffic effects under the HST Alternative. This was also done for any other freeway screenlines that might be affected by this combination of traffic. Only the analyses of the local HST station screenlines are limited to just the effects of the station traffic.

Most freeway segments in the study corridors of I-80, US 101, I-880, I-580, and SR 152 were very congested, operating in 1998 at level of service (LOS) F in the AM-peak hour in the peak direction. The exceptions to the congestion were north of the San Francisco Airport on US 101, which had been widened in recent years, and on US 101 in Gilroy. Given that most freeway segments have LOS F, it is not surprising that cordons around the San Francisco, Oakland, and San José airports were found to be very congested in 1998, experiencing LOS F in the peak direction of the AM peak hour Appendix A, with V/C ratios ranging from 1.11 to 1.16.

2.5 BASELINE CONDITIONS FOR TRANSIT IN THE STUDY AREA

Appendix E, Figure E-9 shows the 1998 conditions for transit on intercity freeway links and within station areas. Because intercity freeways provide the primary access to airports, the freeway links also describe the transit conditions to the major airports. With the exception of the Bay Bridge and downtown San Francisco and Oakland station locations, the existing condition is uniformly "L," with transit capacity exceeding demand. The exceptions are the result of BART being overcapacity on at least two of its Transbay lines, affecting the Bay Bridge link as well as the downtown San Francisco and the two downtown Oakland station locations. Additionally, some Muni transit lines feeding downtown San Francisco are overcapacity in the AM peak hour.

2.6 BASELINE CONDITIONS FOR GOODS MOVEMENT (TRUCK/FREIGHT) IN THE STUDY AREA

Vehicles for goods movements use two sets of roadways: the intercity freeway links and local roads to access their destinations. The only location where the system alternatives would affect the local roads would be in the vicinity of major goods movement destination is adjacent to the Port of Oakland. Appendix E Figure E-10 shows screenlines for both the intercity freeway links across the Bay Area and the arterial roads next to the Port of Oakland. Intercity freeway links are congested at the peak hour currently and with increasing traffic and can be expected to have higher congestion in the future. Impacts are rated high (H), low (L), and medium (M), based on the V/C.³ Most freeway links are rated "M" in the peak direction and "L" in the off-peak direction, with exceptions as noted previously north of the San Francisco Airport and in Gilroy. SR-152 in Los Baños is rated "H" because of extreme congestion. The congestion experienced on the arterial roads to the Port of Oakland was rated "L." Thus goods movement is subjected to high congestion throughout most of the highway network affected by the system alternatives with the exception of the local arterial streets providing direct access to the Port of Oakland and on US 101 in Gilroy and just north of the San Francisco Airport.

³ High = V/C > 1.5, Medium = 1-1.5, Low < 1

2.7 BASELINE CONDITIONS FOR PARKING IN THE VICINITY OF STATIONS AND AIRPORTS

Appendix E, Figure E-11 describes parking conditions in the vicinity of stations and airports. For all Caltrain stations other than the Millbrae station, there is sufficient parking for the baseline conditions. There is adequate parking at the affected BART stations in the East Bay, except for the Oakland City Center. There are currently no transit facilities near the proposed Auto Mall Parkway and Los Baños stations. Hence the impacts at these two stations would be low. In downtown San Francisco and Oakland (City Center) as well as at the three major airports, the excess of supply over demand is primarily a function of the marketplace, which is to say that parking is available for a price. For example, in the area around the Transbay Terminal in San Francisco, parking occupancy is currently about 85 percent, partly because prices can range as high as \$25 per day. A similar situation exists at the three airports where parking can provide enough revenue to ensure supply in the area, if not on site. Hence, with the exception of the Millbrae Caltrain Station, which currently has its parking disrupted by construction of an intermodal station with BART, all current parking conditions are rated "L," indicating that parking supply exceeds demand. Millbrae is rated as "M," indicating that parking demand exceeds supply.

3.0 EVALUATION METHODOLOGY

The traffic, transit, circulation and parking analyses for this program-level EIR/EIS were focused on a broad comparison of potential impacts to traffic, transit, circulation and parking along corridors for each of the alternatives (modal and high-speed train alternatives) and around stations. The potential impacts for each of these alternatives were compared with the No-Project Alternative.

Highway, roadways, passenger transportation services (bus, rail, air, and intermodal), transit facilities, goods movements and parking issue were evaluated in the analyses. Transportation facilities, highways and roadways included in the analyses: 1) serve as the primary means of access to proposed rail stations and airport facilities as well as highway/roadway improvements/new facilities in the Modal Alternative; and 2) are within one mile of proposed rail stations and (in the Modal Alternative) airports and major routes along alignment/highway corridors.

Initial analysis included identifying primary routes to be considered including highways designated in the No-Project and Modal alternatives and all modes of access to the stations areas and airport areas in the Modal and HST Alternatives, respectively. The primary routes/modes of access for the stations and airports considered assumptions for distribution of trips by direction.

Once primary routes were identified, screenlines or cordons combining segments of the primary routes which reasonably represent locations for evaluating in the aggregate baseline traffic and public passenger transportation conditions (using data for 2002, 2020 or other similar years as available) in the morning peak-hour were selected. The use of screenlines or cordons is necessitated by the scale of this analysis with its requirement to evaluate roadway conditions throughout the state. A more detailed analytical framework must necessarily be reserved for future analyses of individual projects.

Screenlines, especially on intercity highway links, have been selected to represent typical conditions. The data used in the evaluation of traffic volumes and capacities at the screenlines therefore are typical values based on averages over time and represented in traffic forecasting tools used by the regional transportation planning agencies. As such, the conditions indicated in the evaluation may not always reflect the experiences of travelers at any particular place at any specific time. For example, localized capacity restrictions (e.g., bottlenecks at a given interchange) are not well-represented in those regional traffic models. In addition, incidents on the road such as accidents and vehicle breakdowns (non-recurring congestion) are not represented in regional traffic models. This unpredictable type of incident is responsible for the majority of congestion in urban highway networks. The result of these limitations of the methodology and data used in this analysis is that many times the level of service shown in the evaluation may be more optimistic than what would actually be experienced on the roadway under the forecasted conditions. Thus, it is important to consider the differences between the alternatives compared versus focusing on the absolute value of the indicators (V/C and level of service).

No new traffic counts were made where data was not available, and the respective Metropolitan Transportation Commission (MTC) and Sacramento Area Council of Governments (SACOG) regional travel forecasting models were assumed sufficiently accurate for purposes of forecasting traffic on the screenlines or cordons chosen. Next baseline conditions were evaluated using the following methodology:

- Baseline (1998 and 2020) ratios of demand to capacity across each screenline or cordon for roadway and public transportation facilities were established using Highway Capacity Manual standards for capacity.

- Baseline conditions (1998, 2020) were established for roadways based on available counts of existing weekday-morning peak-hour traffic volumes on roadway segments (not intersections) to be analyzed. This involved comparing existing volumes to capacity (V/C) to determine level of service at link level.
- Baseline conditions (1998) were established through available counts of existing weekday-morning peak-hour loading on public transportation links and services. No new traffic counts were assumed when data was not available. This entailed comparing existing loading to theoretical capacity of service or facility to determine load factor at the link level; using the standard Highway Capacity Manual.
- Baseline conditions (1998, 2020) were characterized for goods movement (truck/freight) in the general area of study (primarily to identify key goods movement means/corridors) and for parking in the vicinity of stations and airports. Parking conditions are based on any 2002 parking reserves, local plans for major parking expansion, and adequacy of local parking codes for meeting No-Project growth in demand.

Trip generation was then calculated by adding to baseline volumes, forecasted 2020 demand for high-speed rail and airports, or highways comprising alternatives, plus local trips in 2020 generated by project-related development (as data are available) and trips due to induced growth. Additional trips were distributed to the identified screenlines or cordons (roadway and public transportation) and added those trips to the appropriate baseline volumes for each screenline or cordon. Next, additional trips were distributed for selected segments/links on primary regional routes and modes of access to stations and similar facilities by adding No-Project volumes obtained from 2020 forecasts (from MTC and SACOG), and 2020 travel demand generated by alternatives, to the key accessing facilities (roadways, transit links). This distribution was done at a screenline level to reduce the subjectivity of assigning trips to specific facilities. This involved the following methodology:

- For each screenline or cordon (roadway and public transportation), new ratios of demand to capacity were calculated. Demand is the baseline volumes plus additional trip generation that is available (i.e., trips from project-related development and induced growth may not be available initially); screenline or cordon (roadway and public transportation) capacity will be the baseline capacity plus any improvements included in the alternative being analyzed.
- Link-level analysis of impacts was performed to roadways for weekday morning peak-hour conditions:
- Future No-Project link-capacity conditions were established through available plans from local and regional agencies.
- Screenlines or cordons were evaluated, qualitatively, if alternatives would change link capacity (street closure, grade separation, etc.).
- Future roadway V/C ratios on selected segments were determined by comparing future volumes with and without alternatives with future capacity. Future V/C ratios with and without alternatives were analyzed. This assessment was done at a screenline level for major facilities accessing stations or airports. Capacity levels were based on the Highway Capacity Manual, 1994.
- Link-level analysis of impacts was performed to public transportation services for weekday morning peak-hour conditions.
- Future No-Project service or link capacity through available plans from local and regional agencies was established.

- Future link load factor by comparing the future volumes with and without alternatives with future capacity of selected links and services were determined.
- Impacts were determined by comparing future load factors with and without alternatives.

Summary tables for the region were then completed that identify impacts on highways/roadways (at screenline), public transportation services, goods movement, and parking facilities. The impacts are described and ranked as 'high', 'medium', or 'low' in the summary table according to the potential extent of change to traffic, transit, circulation and parking.

The final step included identifying mitigation strategies for avoidance of potential impacts related to traffic, circulation and parking. Most mitigation involved subsequent analysis of traffic, circulation or parking in the next phase of work.

4.0 TRAFFIC, TRANSIT, CIRCULATION AND PARKING IMPACTS

Table 4 summarizes the traffic and circulation potential impacts for the Existing Conditions, No-Project, Modal and HST Alternatives. Table 5 summarizes the potential impacts for Public Transit, Goods Movement and Parking Facilities for all Alternatives. The following sections describe these potential impacts in greater detail.

Table 4: Impacts to Traffic

LOCATION	EXISTING V/C, LOS ¹	FUTURE NO- PROJECT V/C, LOS ¹	% CHANGE FROM EXISTING	MODAL ALTERNATIVE V/C, LOS ¹	% CHANGE FROM NO- PROJECT	HIGH-SPEED TRAIN ALTERNATIVE V/C, LOS ¹	% CHANGE FROM NO- PROJECT
Intercity Highway Links (Freeways)²							
US 101: SF—SF Airport	0.98 E	1.06 F	+9%	1.06 F	0%	0.86 D	-19%
US 101: SF Airport—Redwood City	1.29 F	1.37 F	+6%	1.14 F	-17%	1.16 F	-15%
US 101: Redwood City—I-880	1.10 F	1.30 F	+18%	1.04	-20%	1.22 F	-6%
US 101: I-880—San José	1.16 F	1.19 F	+2%	0.95 E	-20%	1.08 F	-9%
US 101: San José—Gilroy	1.21 F	0.89 D	-27%	0.71 C	-20%	0.86 D	-3%
US 101: Gilroy—SR 152	0.63 B	0.70 C	+11%	0.53 A	-25%	0.66 B	-5%
SR 152: US 101—I-5	1.33 F	1.21 F	-9%	0.60 B	-50%	1.08 F	-10%
SR 152: I-5—SR 99	1.53 F	1.71 F	+12%	1.14 F	-33%	1.68 F	-2%
I-80: SF—I-880	1.16 F 55 MPH	1.28 F 50 MPH	+10% -9%	1.28 F 50 MPH	0% 0%	1.26 F 51 MPH	-2% +2%
I-80: I-880—I-5	1.15 F	1.33 F	+16%	1.00 F	-25%	1.32 F	-0.4%
I-880: I-80—I-580	1.25 F	1.36 F	+9%	1.08 F	-20%	1.29 F	-5%
I-580: I-880 via I-238—I-5	1.18 F	1.26 F	+7%	1.05 F	-17%	1.24 F	-1%
I-880: I-580—Fremont/Newark	1.34 F	1.22 F	-9%	0.98 E	-20%	1.20 F	-2%
I-880: Fremont/Newark—US 101	1.31 F	1.18 F	-10%	0.88 D	-25%	1.18 F	-0.3%
HST Stations—Cordon²							
San Francisco-TBT	0.81 D	0.89 D	+9%	0.89 D	0%	1.01 F	+13%
San Francisco—4 th	0.54 A	0.51 A	-7%	0.51 A	0%	0.70 C	+38%
Millbrae	0.74 C	0.94 E	+27%	0.94 E	0%	0.96 E	+2%
Redwood City	0.65 B	0.64 B	-2%	0.64 B	0%	0.67 B	+6%
Palo Alto	0.89 D	0.42 A	-53%	0.42 A	0%	0.46 A	+10%
Santa Clara (O)	0.72 C	0.77 C	+7%	0.77 C	0%	0.90 D	+17%
San José	0.38 A	0.56 A	+50%	0.56 A	0%	0.63 B	+13%
West Oakland	0.19 A	0.26 A	+36%	0.26 A	0%	0.33 A	+29%
Oakland City Ctr	0.46 A	0.48 A	+5%	0.48 A	0%	0.56 A	+16%
Oakland Coliseum	0.35 A	0.47 A	+34%	0.47 A	0%	0.53 A	+13%
Union City (O)	0.59 A	0.58 A	-1%	0.58 A	0%	0.61 B	+5%
S. Alameda (O)	0.29 A	0.56 A	+89%	0.56 A	0%	0.61 B	+11%
Morgan Hill	0.49 A	0.59 A	+21%	0.59 A	0%	0.62 B	+4%
Gilroy	0.49 A	0.74 C	+52%	0.74 C	0%	0.77 C	+4%
Los Baños	0.53 A	0.79 C	+49%	0.79 C	0%	0.81 D	+2%
Airports—Cordon²							
San Francisco	1.11 F	1.20 F	+8%	1.12 F	-6%	1.03 F	-14%
Oakland	1.14 F	1.26 F	+11%	1.01 F	-20%	1.18 F	-7%
San José	1.16 F	1.22 F	+5%	1.00 F	-17%	1.16 F	-4%

¹ LOS values are defined from V/C values as follows: up to 0.60=A, above 0.60 to 0.70=B, above 0.70 to 0.80=C, above 0.80 to 0.90=D, above 0.90 to 1.00=E, above 1.00=F

² Peak AM direction.

Source: Parsons Corporation, Junel 2003.

Table 5: Impacts to Public Transit, Goods Movement and Parking

LOCATION	EXISTING CONDITION (H, M or L)	FUTURE NO- PROJECT CONDITION (H, M or L)	MODAL ALTERNATIVE (H, M or L)	HIGH-SPEED TRAIN ALTERNATIVE (H,M or L)
Public Transit				
Alignment				
SF To Oakland (Bay Bridge) - I-80: SF—I-880	M	M	M	M
SF To San José - US 101: SF Airport—Redwood City	L	L	L	L
San José To Gilroy - US 101: San José—Gilroy	L	L	L	L
Gilroy To Los Baños - SR 152: US 101 - I5	L	L	L	L
I-580: I-880 via I-238—I-5	L	L	L	L
I-880: I-80—I-580	L	L	L	L
I-880: Fremont/ Newark—US 101	L	L	L	L
Stations				
San Francisco-TBT	M	M	M	M
San Francisco—4 th	L	L	L	M
Millbrae	L	L	L	L
Redwood City	L	L	L	L
Palo Alto	L	L	L	L
Santa Clara (O)	L	L	L	L
San José	L	L	L	L
West Oakland	M	M	M	M
Oakland City Center	M	M	M	M
Oakland Coliseum	L	L	L	L
Union City (O)	L	L	L	L
S. Alameda (O)	L	L	L	L
Morgan Hill	L	L	L	L
Gilroy	L	L	L	L
Los Baños	L	L	L	L
Goods Movement				
SF To San José - US 101: SF Airport—Redwood City	M	M	M	M
San José To Gilroy - US 101: San José—Gilroy	M	L	L	L
Gilroy To Los Baños - SR 152: US 101 - I5	M	M	L	M
Los Baños To Merced - SR 152: I-5—SR 99	H	H	M	H
SF To Oakland (Bay Bridge) - I-80: SF—I-880	M	M	M	M
I-580: I-880 via I-238—I-5	M	M	M	M
I-880: I-80—I580	M	M	M	M
I-880: Fremont/ Newark—US 101	M	M	L	M
Parking Facilities				
Stations				
San Francisco-TBT	L	L	L	L
San Francisco—4 th	L	L	L	L
Millbrae	M	L	L	L
Redwood City	L	L	L	L
Palo Alto	L	L	L	L
Santa Clara (O)	L	L	L	L
San José	L	L	L	L
West Oakland	L	L	L	L

Table 5: Impacts to Public Transit, Goods Movement and Parking

LOCATION	EXISTING CONDITION (H, M or L)	FUTURE NO- PROJECT CONDITION (H, M or L)	MODAL ALTERNATIVE (H, M or L)	HIGH-SPEED TRAIN ALTERNATIVE (H,M or L)
Oakland City Center	L	L	L	L
Oakland Coliseum	L	L	L	L
Union City (O)	L	L	L	L
S. Alameda (O)	L	L	L	L
Morgan Hill	L	L	L	L
Gilroy	L	L	L	L
Los Baños	L	L	L	L
Airports				
San Francisco	L	L	L	L
Oakland	L	L	L	L
San José	L	L	L	L

Source: Parsons Corporation, April 2003.

4.1 NO-PROJECT ALTERNATIVE

4.1.1 Station Area and Intercity Link Conditions in 2020—AM-Peak Hour

Table 4 depicts station screenline conditions for 2020 future baseline conditions and intercity highway link demand (volume)-to-capacity (V/C) ratios and ratings. Table 4 shows corridor and station screenline conditions for 1998 existing and 2020 future baseline conditions and summarizes intercity highway link demand (volume)-to-capacity (V/C) ratios and ratings for 1998 existing and 2020 future baseline conditions. Appendix B contains backup data for station screenline analyses while Appendix C describes the link analyses for intercity highway links that considers only diversion from intercity trips. Appendix D analyzes intercity links that could potentially be affected by the combination of intercity trips, station trips, and airport trips. The results of analyzing the combined trips are reported in Table 6.

Most of the station areas have worse levels of service in 2020 than in 1998. The cordon summary in Appendix A and Table 4 show that of the 15 station areas analyzed, 11 of them show LOS deterioration at the cordon level, and two of the remaining three show very little improvement. Although 13 of the 15 are projected to have a cordon LOS of A, B, or C in 2020, only three station areas are not projected to have LOS F on one or more streets that make up the cordons: West Oakland, Oakland Coliseum, and Los Baños (Appendix F, Table F-1). All the rest have an average of three streets projected to experience LOS E or F in 2020. Thus the situation is worse than in 1998 when six station areas did not have streets with LOS F (Appendix F, Table F-1).

The summaries of the corridor highway link analyses (Appendix F, Figure F-1 and Table F-2), indicate that all but two of the 14 intercity freeway links are projected to be over capacity (LOS F) in future baseline conditions (2020). While this was the same number over capacity (LOS F) in 1998, the traffic congestion is expected to be worse overall because congestion is projected to increase on most links between 1998 and 2020. LOS are projected to worsen in 2020. The major exceptions are on US 101 between San José and Gilroy and on I-880 north of San José, where additional lanes will be added in the study period, resulting in LOS improvements compared with 1998. The worst conditions were projected to be on SR 152 in Los Baños, where the LOS would worsen between 1998 and 2020.

Airport cordons, which are made up of freeway links discussed above (Appendix F, Figure F-1, Table F-2) would deteriorate under the No-Project Alternative compared with existing (1998) conditions. The V/C

ratios for the three AM-peak direction airport cordons would increase by 5 to 11 percent compared with the existing conditions. All would remain at LOS F, with V/C ratios ranging from 1.20 to 1.26.

4.1.2 Public Transit Conditions in 2020

Figure E-9 in Appendix E and Table 5 show the 2020 conditions for transit on intercity freeway links and within station areas. Public transit conditions in 2020 are projected to have the same ratings as in 1998, with all ratings "L" except "M" where affected by overcapacity BART lines in downtown San Francisco, Oakland, and the link in between. Additionally, some Muni transit lines feeding downtown San Francisco are expected to be overcapacity in the AM peak hour.

4.1.3 Goods Movement Conditions in 2020

Vehicles for goods movements use two sets of roadways: the intercity freeway links and local roads to access their destinations. The only location where the system alternatives would affect the local roads would be in the vicinity of major goods movement destination is adjacent to the Port of Oakland. Appendix E, Figure E-10 shows a total of 25 screenlines including both the intercity freeway links across the Bay Area and the arterial roads next to the Port of Oakland. For 2020 No-Project conditions, in the off-peak direction, the goods movement conditions for six links worsen when compared to 1998. For two links, the northernmost link considered on I-80, and the link on I-880, just before SR-84, the impacts reduce from medium to low. For the peak direction, six links have worse impacts than 1998. The US 101 link (to the south of San José and SR-85) is the only link in the peak direction for which conditions improve. The impact reduces from a medium in 1998 to a low in 2020 (Table 5).

4.1.4 Parking Conditions in 2020

Appendix E, Figure E-11 describes parking conditions in the vicinity of stations and airports. For the baseline conditions, with the exception of the Millbrae Caltrain Station that is rated "M," all current parking conditions are rated "L," indicating that parking supply exceeds demand. By 2020 the new 4000-car parking garage will be built at Millbrae and this will bring down the impact to an "L." At downtown San Francisco and Oakland, parking can provide enough revenue to ensure supply in the area, if not on site. The expectation for 2020 is that the excess of supply over demand will continue by virtue of the marketplace finding if profitable to continue providing parking.

Additions of privately operating parking garages near San José Airport will help maintain the impact at "L." When the 6000 space multi-level parking garage opens, the Oakland Airport will increase its parking capacity from the current 8,000 spaces to 14,000. The 4,000-space long-term parking lot at the corner of Pardee Drive and Swan Way, an off-site location will also help the parking situation. Of all the three airports within the Bay Area to Merced study region, the San Francisco Airport has the highest parking prices. However, as for the downtown areas, the expectation for parking conditions at 2020 near airports is that the excess of supply over demand will continue by virtue of the marketplace finding if profitable to continue providing parking. Thus the impact at all airports is "L."

Caltrain's Capital Improvement Program plans to add 3000 spaces to Caltrain stations. This would be sufficient to keep all Caltrain stations at a low impact. Parking conditions in 2020 for all other locations are projected to have the same ratings as in 1998. Thus, parking conditions in the vicinity of stations and airports will have a low impact in 2020.

4.2 MODAL ALTERNATIVE

4.2.1. Trip Generation by Airport

The MTC forecasts include the airport access trips in both the 2020 future baseline condition and in the 2020 Modal Alternative. Therefore, no trips are diverted from airports except in the HST Alternative, and by definition, no trips are added in the Modal Alternative. See Section 4.3 for the distribution of trips removed or added around airports under the HST Alternative.

4.2.2. Distribution of Trips to/from Airport or along Roadway

Similar to trip generation above, the trip distribution under the Modal Alternative is identical to that of the No-Project Alternative. All traffic volumes are drawn directly from the MTC forecasts for the No-Project and Modal alternatives. Appendices C and D describe the 2020 baseline traffic volumes on freeways.

Appendix B gives the trip volumes by arterial link around station areas. See Section 4.3 for the distribution of trips removed or added around airports or along roadways under the HST Alternative.

4.2.3. Roadway Impacts by Screenline or Cordon—AM-Peak Hour

Appendix G, Figure G-1 depicts the 2020 long-term roadway impacts of the Modal Alternative. Appendix G Tables G-1 and G-2 summarize impacts by roadway link for the station areas and corridors, respectively. The station area levels of service are identical to those of the No-Project Alternative. Refer to Section 4.1.1 for a discussion of the 2020 No-Project conditions in the station areas.

The Modal Alternative would reduce long-term impacts on the freeways by virtue of adding lanes to intercity highways, and by assumption, would not add additional traffic. As noted in Section 1.2.2, adding highway capacity probably would lead to additional traffic that would cause the levels of service to deteriorate with respect to what is projected here. The construction impacts were not analyzed in this study, but there would be substantial disruption to intercity highways, traffic, and surrounding areas from acquiring and clearing right-of-way through largely built up areas, adding pavement width of 30 feet or more, and reconstruction all affected interchanges and overcrossing.

Of the 14 links summarized Appendix G, Table G-2, eight were projected to experience LOS F under the Modal Alternative in 2020. This would be an improvement compared to the 13 of 14 links projected to experience LOS F under the No-Project Alternative. The 24 screenlines shown in Appendix G, Table G-1 show a similar story, with 11 screenlines remaining at LOS F in the peak direction under the Modal Alternative in 2020, compared with 21 screenlines at LOS F under the No-Project Alternative. The highways projected to have LOS E or better in 2020 under the Modal Alternative include US 101 from San José to Gilroy, SR-152 between US 101 and I-5, and I-880 between I-238 and San José.

The impacts on arterial streets remain the same as in the future baseline conditions. The only 2020 condition that changes the arterial streets around stations is the HST Alternative, discussed in the next section.

Airport cordons, which are made up of freeway links discussed above (Appendix G, Figure G-1 and Table G-2), would improve under the Modal Alternative compared with the No-Project Alternative. The V/C ratios for the three AM-peak direction airport cordons would improve by six to 20 percent compared with the No-Project Alternative. All would remain at LOS F, however, even though the improvement would leave them at a better LOS than in the 1998 baseline conditions.

4.2.4. Public Transit Impacts by Screenline or Cordon

Appendix E, Figure E-9 shows the 2020 Modal conditions for transit on intercity freeway links and within station areas. Public transit conditions are projected to have the same ratings as in 1998 and 2020. In general, public transit links not affected by the Modal Alternative, whose primary effect is to add capacity on highways and at airports to carry currently anticipated 2020 demand.

4.2.5. Goods Movement Impacts

Appendix E, Figure E-10 shows screenlines for both the intercity freeway links across the Bay Area and the arterial roads next to the Port of Oakland. Goods movement is generally improved by the Modal Alternative, with the impacts following the freeway condition improvements resulting from added capacity. As can be seen from the figure, in both the peak and off-peak directions, 11 links show lesser impact when compared to the 2020 No-Project conditions. All other links have the same impact as 2020 No-Project conditions.

4.2.6. Parking Impacts and Issues

Appendix E, Figure E-11 describes parking conditions in the vicinity of stations and airports. In general, parking near station areas is not affected by the Modal Alternative, whose primary effect is to add capacity on highways and at airports to carry currently anticipated 2020 demand.

In 2020 Modal scenario, the three major airports will attract more traffic by virtue of increased capacity. Even so, there would be enough parking to keep the impact at low. Parking at the airports can provide enough revenue to ensure supply in the area, if not on site. Thus the expectation for 2020 Modal condition is that the excess of supply over demand will continue by virtue of the marketplace finding it profitable to continue providing parking. Thus, parking conditions in 2020 for all locations are projected to have a low impact, similar to 2020 No-Project conditions.

4.3 HIGH-SPEED TRAIN ALTERNATIVE

4.3.1. Trip Generation at Rail Stations and Airports

Table 4 gives a summary of the rail station trip generation. All volumes are based on HST ridership added to background volumes for the HST Alternative. Appendix B contains more detail on these volumes. The Oakland Coliseum and Santa Clara stations were analyzed with the trips for the downtown Oakland and San José stations, respectively, as a worst case analysis.

Table 5 shows the trip generation at airports. The airport volumes are assumed to be included in the background volumes for the No-Project and Modal alternatives and are subtracted from the background volumes for the HST Alternative. Appendix D shows the derivation of these volumes.

4.3.2. Distribution of Trips to/from Rail Station and Airports

Appendix H, Figure H-1 shows the distribution of HST trips to and from proposed HST stations. These trips are additions to the background traffic forecast by the MTC travel model for the arterial streets around each station. Appendix B gives the background, station, and total trip volumes by arterial link around station areas.

Appendix H, Figure H-2 shows the distribution of trips removed from the highways under the HST Alternative. These volumes are the net trip diversions from considering the intercity trips removed from the freeways, the airport access trips removed from the freeways, and the HST station trips added to the

freeways to access the stations. In only one case, SR 87 south of the San José Airport, is the value negative, that is, net trips are added to the freeways. In all the other 23 screenline locations, the effect is a positive reduction in traffic.

4.3.3. Roadway Impacts by Screenline or Cordon—AM-Peak Hour

Appendix H, Figure H-3 and H-4 depict the 2020 long-term AM-peak hour roadway impacts of the HST Alternative for station areas and intercity freeway links, respectively. Appendix H, Table H-1 and Appendix G, Table G-2 tabulate the 2020 long-term AM-peak hour roadway impacts of the HST Alternative for station areas and intercity freeway links, respectively. Airport cordon screenlines are shown in Appendix H, Figure H-3 and Appendix G, Table G-2. The following subsections discuss these impacts and other effects of the HST Alternative.

4.3.3.1 Impacts within Station Areas

The HST Alternative would have adverse impacts in station areas as a result of adding traffic to streets already congested with other traffic under the No-Project Alternative in 2020. Note that the 2020 station area traffic would be the same under both the No-Project and the Modal alternatives. Eight of the 15 potential station areas are projected to drop one or more letter grades in LOS at the station cordon level Appendix H, Figure H-3 The most extreme case would be downtown San Francisco, which would drop from LOS D to F. Santa Clara and Los Baños station cordons are projected to drop from LOS C under the 2020 No-Project Alternative to LOS D under the HST Alternative. The Santa Clara Station was analyzed, however, with the total demand for the San José Station, which probably overstates the station trips by a factor of three or four, since Santa Clara would be an optional additional station to the San José Station. The Millbrae Station is projected to remain at LOS E, with the V/C increasing slightly under the HST Alternative compared with the No-Project Alternative.

As discussed in Section 4.1.1, individual streets within the station are projected to have LOS worse than the cordon LOS (Appendix H, Table H-1). Under the No-Project and Modal alternatives, only three station areas are not projected to have LOS F on one or more streets that make up the cordons: West Oakland, Oakland Coliseum, and Los Baños. A similar situation is projected to exist under the HST Alternative, but the numbers of streets at LOS E or F in the station cordons go up slightly. Under the No-Project and Modal alternatives, there would be 28 streets operating at LOS F and five at LOS E in the 15 station areas. Under the HST Alternative, there would be 30 streets operating at LOS F and eight at LOS E in the 15 station areas. Overall, V/C ratios for streets in the 15 station areas would go about five percentage points compared with the No-Project and Modal alternatives.

4.3.3.2 Impacts on Highway Links and at Airport Cordons

Appendix H, Figure H-3 depicts the 2020 long-term roadway impacts of the HST Alternative. Appendix G, Table G-2 and Appendix H, Table H-1 summarize impacts by roadway link for the corridors and station areas, respectively.

The HST Alternative would reduce long-term impacts on the freeways by taking traffic away from the freeways. Of the 14 links summarized in Appendix G, Table G-2, 13 were projected to experience LOS F under the HST Alternative in 2020. This is similar to the 2020 No-Project conditions, while there were eight links at LOS F under the Modal Alternative. The 24 screenlines shown on Appendix H, Figure H-3 show a similar story, with 21 screenlines remaining at LOS F in the peak direction under the HST Alternative in 2020, compared with 11 and 21 screenlines at LOS F under the Modal and No-Project Alternative, respectively.

Table 4
Trip Generation at HST Stations

Stations	Total Daily Person Trips					AM Peak Hour Vehicle Trips (Auto – Equivalents)
	Daily Boardings	Bus/ Shuttle	Taxi	Self	Drop-off	
San Francisco-TBT	21,523	3,228	4,305	2,152	2,152	2,169
San Francisco—4th	21,523	3,228	4,305	2,152	2,152	2,169
Millbrae	2,885	433	433	288	288	268
Redwood City	6,253	625	625	2,189	1,876	1,125
Palo Alto	6,253	625	625	2,189	1,876	1,125
West Oakland	10,200	1,530	1,530	1,530	2,040	1,485
Oakland City Center	10,200	1,530	1,530	1,530	2,040	1,485
Oakland Coliseum ¹	10,200	1,530	1,530	1,530	2,040	1,485
Union City (O)	2,705	406	135	1,082	812	466
S. Alameda (O)	2,705	406	135	1,082	812	466
Santa Clara ¹ (O)	12,094	2,419	1,814	1,814	3,628	1,819
San José	12,094	2,419	1,814	1,814	3,628	1,819
Morgan Hill	2,752	413	138	1,101	825	474
Gilroy	2,752	413	138	1,101	825	474
Los Baños	193	29	10	116	39	29

¹ These two stations were analyzed with the traffic volume of the primary station as a worst case for traffic generation.

Source: Kaku Associates, October 2002.

Table 5
Trip Generation at Airports

Airport Area	Station Area	2020 Forecast Annual Passenger Demand by Station Area (Million)	Peak Hour Trips ¹ (Auto – Equivalents)
Oakland	Fremont	2,493,376	766
	Oakland	6,677,348	2,051
San José	Gilroy	809,726	260
	San José	5,690,798	1,830
SF Airport	Redwood City	1,859,407	571
	San Francisco	7,064,213	2,169
	SF Airport	2,259,515	694

¹ Mode-split and peak hour percentage was assumed to be similar to comparably located HST stations.

Source: Kaku Associates, October 2002.

The highways projected to have LOS E or better in 2020 under the HST Alternative include US 101 from San Francisco to San Francisco Airport, US 101 from San José to Gilroy and US 101 from Gilroy to SR152.

Airport cordons, which are made up of freeway links discussed above in Appendix H, Figure H-3 and Appendix G, Table G-2 would improve under the HST Alternative compared with the No-Project Alternative. The V/C ratios for the three AM-peak direction airport cordons would improve by four to 19 percent compared with the No-Project Alternative. For the Modal Alternative the V/C ratios improve from six to 20 percent. The LOS at the SFO cordon will improve from an F in both No-Project and Modal Conditions to an E in the HST condition. The other two airport cordons would remain at an LOS F, as for the No-Project and Modal Conditions.

4.3.3.3 Changes in Impacts with Alignment Options

There would be limited changes in traffic impacts with alignment options. The most obvious category would occur with the following station alternates or options:

- San Francisco Transbay Terminal versus San Francisco 4th and King
- Redwood City versus Palo Alto
- West Oakland versus City Center/12th Street
- Union City versus Auto Mall Parkway (I-880 Option versus the Mulford Line Option)
- Gilroy versus Morgan Hill (Gilroy Option versus the Gilroy Bypass Option)
- Optional Santa Clara Station

In each of the alternate station cases above, the selection of one alternate station avoids the projected station area impacts at the other alternate station and vice versa. Likewise, there are no Santa Clara Station impacts if the optional station is not built.

There are two options that would slightly affect US 101 freeway traffic south of San José and one option that would slightly affect I-880 traffic north of Fremont/Newark:

- Gilroy Option versus the Gilroy Bypass Option
- Corridor 1A versus Corridor 1B (see Subsection 1.2.3.1 for option details)
- I-880 Option versus Mulford Line Option

The results presented above assumed the implementation of Corridor 1A with the Gilroy Option. If the Gilroy Bypass Option is chosen instead of the Gilroy Option, there would be a station in Morgan Hill instead of Gilroy, with the result that some Gilroy traffic would have to travel north on US 101 to reach the Morgan Hill Station. LOS would remain B in the AM-peak direction and A in the AM off-peak direction.

If the Corridor 1B Option is implemented, there would be no stations at Los Baños, Gilroy, or Morgan Hill. Traffic in Gilroy would be the same as under the Gilroy Bypass Option. Traffic on US 101 south of SR-85 would increase by about one percent.

Similarly, if the Mulford Line Option is implemented and the Auto Mall Station is chosen instead of the Union City Station, traffic would increase by about two percent on I-880 north of SR 84. with no change in LOS.

4.3.3.4 Benefits from Grade Separations, Increased Reliability

There would be additional benefits of the HST Alternative in addition to an effective capacity increase on major roadways. One primary benefit would be the elimination of traffic delay at existing at-grade

crossings along the rail corridors. An indication of this delay savings is given by Table 8, which lists the estimated daily vehicle delay savings that would be achieved from the grade separation of six sample crossings along the Caltrain shared use corridor. The four- and six-lane arterial streets were projected to have average daily traffic (ADT) ranging from about 15,000 to 40,000 vehicles per day in 2020. Delay savings with grade separations were estimated to range from about ten vehicle hours per day at the lowest volumes to almost 200 vehicle hours per day at the highest volumes. Train volumes were assumed to be 86 trains per day in 2001 and 176 trains per day in 2020. The trains were mostly short five-car passenger trains (450 feet) and six short freight trains (750 feet). Except when stopping for stations, train speeds were assumed to the speed limit of the track, which ranged from 35 to 70 MPH (60 MPH for freights). Similar computations could be made for all grade separations that would be eliminated by the HST Alternative.

Table 8
Average Daily Traffic Counts and Grade Crossing Delay Projections on
Caltrain Corridor

Railroad Crossing & City	2001		2020	
	ADT	Delay ²	ADT	Delay ²
Sunnyvale Avenue, Sunnyvale ¹	11,900	4.3	14,600	9.5
Castro Street, Mountain View ¹	15,900	6.2	19,500	17.2
Ravenswood Avenue, Menlo Park	20,500	18.3	26,000	171.9
3rd Avenue, San Mateo	14,600	6.3	16,600	11.2
Broadway, Burlingame	35,600	38.9	40,800	195.0
San Bruno Avenue, San Bruno	26,500	31.8	30,200	123.6
¹ Estimated from peak hour count.				
² Vehicle hours per day.				
Source: Parsons, October 2002.				

The grade separations would also improve the reliability of both the vehicle trips crossing the HST corridors as well as the reliability of the existing, non-HST train trips within the corridors. Currently, the entire Caltrain line is frequently stopped for an hour or more at a time because of accidents at either grade crossings or from pedestrian intruding into the right-of-way. A grade-separated corridor would prevent these conflicts between trains and motor vehicles or pedestrians.

4.3.4. Public Transit Impacts by Screenline or Cordon

Appendix E, Figure E-9 shows the 2020 HST conditions for transit on intercity freeway links and within station areas. Public transit conditions are projected to have the same ratings as in 1998 and 2020 conditions. In general, public transit links are not greatly affected by the HST Alternative, given the primary access by auto at most stations.

4.3.5. Goods Movement Impacts

Appendix E, Figure E-10 shows screenlines for both the intercity freeway links across the Bay Area and the arterial roads next to the Port of Oakland. Goods movement is generally improved by the HST Alternative, with the impacts following the freeway condition improvements resulting from diverted traffic. As can be seen from the figure, for the peak and off-peak directions, one and two links respectively show lesser impact when compared to the 2020 No-Project conditions. All other links have the same impact as 2020 No-Project conditions.

When compared to the 2020 Modal conditions, nine links have worse impacts in the 2020 HST scenario for off-peak direction. All the other links have the same impact as the 2020 Modal conditions. For the peak direction, 11 links have worse impact than 2020 Modal conditions. Goods movement impacts on the link on US 101 (just above 380, near the San Francisco airport) improves from a medium impact in 2020 Modal to a low impact in 2020 HST conditions. All the other sections have the same goods movement impacts as the 2020 Modal conditions.

4.3.6. Parking Impacts and Issues

Appendix E, Figure E-11 describes parking conditions in the vicinity of stations and airports. Our assumption⁴ is that HST will provide parking for all station areas, except downtown San Francisco and Oakland. In downtown San Francisco and Oakland as well as at the three major airports, the excess of supply over demand is primarily a function of the marketplace, which is to say that parking is available for a price. The expectation for the HST scenario is that the excess of supply over demand will continue by virtue of the marketplace finding it profitable to continue providing parking. Thus, the parking conditions in 2020 HST conditions for all locations are projected to have a low impact, similar to 2020 No-Project and Modal conditions.

⁴ CAVEAT: If HST does not provide parking at these stations, there could be parking impacts at these stations.

5.0 PREPARERS

Guillaume Shearin Project Manager	Ph.D., M.S., B.S.M.E./A.E. 29 years of experience in Transportation Planning Led analysis and report preparation.
Sathya Thyagaraj Transportation Modeler	B.Tech., M.S. More than 10 years of experience in Transportation Modeling Extracted link data from MTC models and estimated data where gaps existed.
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6.0 SOURCES OF DATA/INFORMATION

- MTC and SACOG models were the source of traffic data. Traffic data from City of Oakland was used for a street at the Oakland City Center.
- Reports and figures on High Speed Rail Project from the Project Solve website.
- Caltrain and BART – Information regarding their parking facilities.

Appendix A

Appendix B

Appendix C

Appendix D

Appendix E

Appendix F

Appendix G

Appendix H